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	LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION SPECIFICATION	APPLICABLE GROUP AVC LIQUID CRYSTAL DISPLAY GROUP

DEVICE SPECIFICATION FOR

TFT - LCD module

MODEL No. LQ201X3LZ11

CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

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SHARP CORPORATION

RECORDS OF REVISION

MODEL No : LQ201X3LZ11

SPEC No : LD-16610

	NO.		PAGE	SUMMARY	NOTE
2004.10.12			-	-	1st Issue

1. Application

This specification sheets applies to the color 20.1" XGA TFT-LCD module LQ201X3LZ11.

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2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit, inverter circuit, back light system and etc. Graphics and texts can be displayed on a 1024×RGB×768 dots panel with about 16 million colors by supplying data signal of 24 bit(8 bit x RGB), 3 kind of timing signal, +5V of DC supply voltages and +12V of DC supply voltage for back light.

Also, this module includes the DC/AC inverter to drive the CCFT lamps.

And in order to improve the response time of LCD, this module applies the O/S (over shoot) driving technology for the control circuit .In the O/S driving technology, signals are being applied to the Liquid Crystal according to a pre-fixed process as an image signal of the present frame when a difference is found between image signal of the previous frame and that of the current frame after comparing them.

By using the captioned process, the image signals of this LCD module are being set so that image response can be completed with in one frame, as a result, image blur can be improved and clear image performance can be realized.

By programming panel surface temperature into the module, this function enables to achieve high response time in every gray (color) scale.

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	51 (Diagonal)	cm
	20.1 (Diagonal)	inch
Active area	408.6 (H) x 306.4 (V)	mm
Pixel Format	1024 (H) × 768 (V) (1pixel = R + G + B dot)	pixel
Pixel pitch	0.133 (H) × 0.399 (V)	mm
Pixel configuration	R, G, B vertical stripe	
Display mode	Normally black	
Unit Outline Dimensions *1	450.4(W) ×340.45(H) × 45.1(D)	mm
Mass	2480±150	g
Surface treatment	Anti Glare, low reflection coating Hard Coating: 2H Haze: 23 +/- 5%	

(*1)Outline dimensions are shown in Fig.1

4. Input Terminals

4-1. Control circuit driving

CN1 (Interface signals and +5V DC power supply ; Shown in Fig.1)

Using connector : FI-X30SSL-HF (Japan Aviation Electronics Ind. , Ltd.)

Mating connector : FI-X30H,FI-X30C or FI-X30M (Japan Aviation Electronics Ind. , Ltd.)

Mating LVDS transmitter: THC63LVDM83A or equivalent device

Pin No.	Symbol	Function	Remark
1	VCC	+5V Power Supply	
2	VCC	+5V Power Supply	
3	VCC	+5V Power Supply	
4	VCC	+5V Power Supply	
5	GND		
6	GND		
7	GND		
8	GND		
9	SELLVDS	Select LVDS data order【Note1】	Pull up Default H:3.3V
10	NC		
11	GND		
12	RIN0-	Negative (-) LVDS differential data input	LVDS
13	RIN0+	Positive (+) LVDS differential data input	LVDS
14	GND		
15	RIN1-	Negative (-) LVDS differential data input	LVDS
16	RIN1+	Positive (+) LVDS differential data input	LVDS
17	GND		
18	RIN2-	Negative (-) LVDS differential data input	LVDS
19	RIN2+	Positive (+) LVDS differential data input	LVDS
20	GND		
21	CLKIN-	Clock Signal(-)	LVDS
22	CLKIN+	Clock Signal(+)	LVDS
23	GND		
24	RIN3-	Negative (-) LVDS differential data input	LVDS
25	RIN3+	Positive (+) LVDS differential data input	LVDS
26	GND		
27	R/L	Horizontal shift direction【Note 2】	
28	U/D	Vertical shift direction【Note 2】	
29	NC		
30	NC		

【Note】

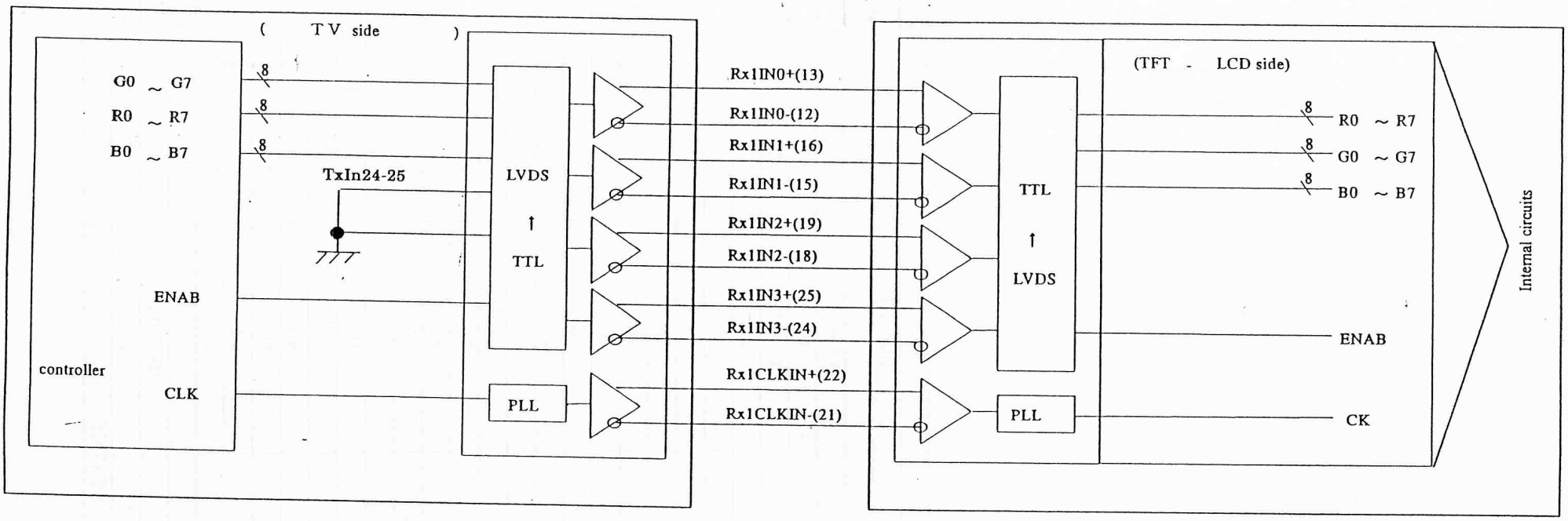
Shield case on the back surface of module contacts to GND of internal circuit.

【Note1】SELLVDS

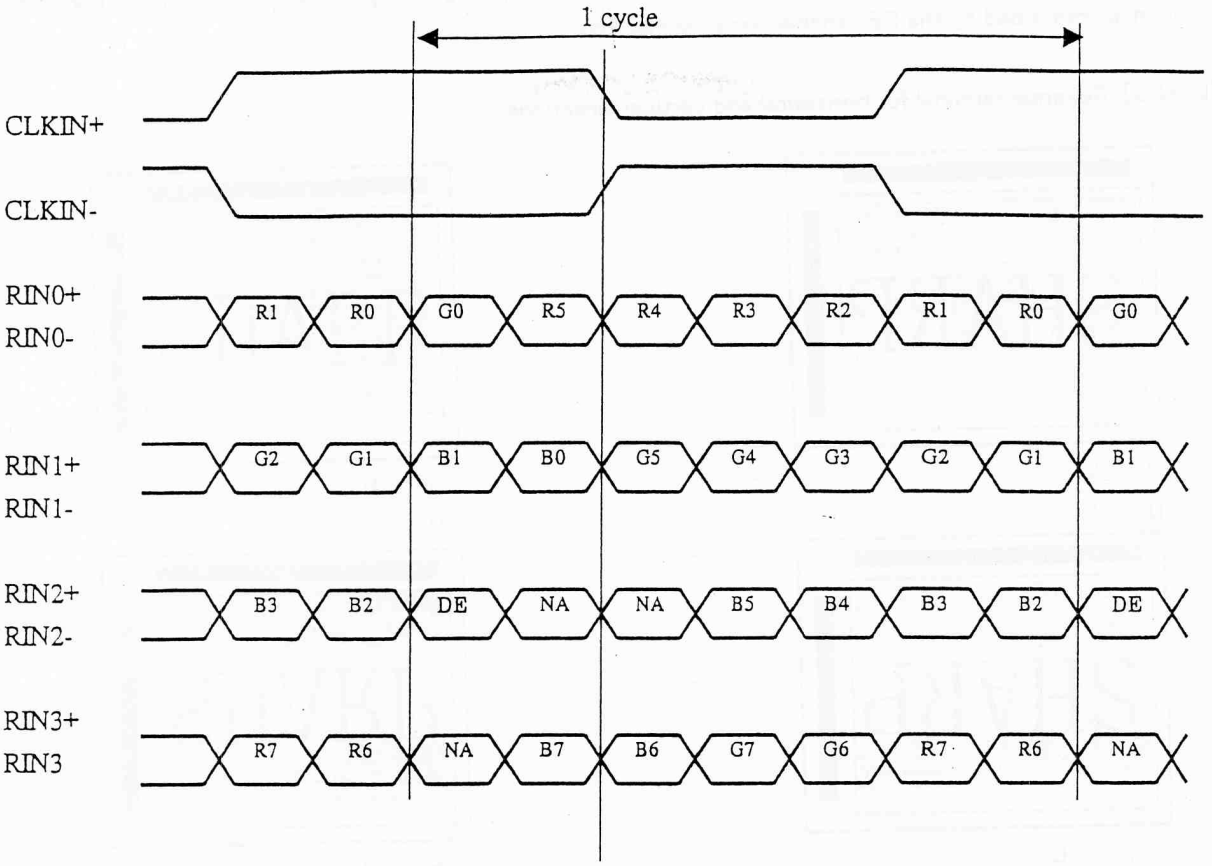
Transmitter		SELLVDS	
Pin No	Data	=L(GND)	=H(3.3V) or Open
51	TA0	R0(LSB)	R2
52	TA1	R1	R3
54	TA2	R2	R4
55	TA3	R3	R5
56	TA4	R4	R6
3	TA5	R5	R7(MSB)
4	TA6	G0(LSB)	G2
6	TB0	G1	G3
7	TB1	G2	G4
11	TB2	G3	G5
12	TB3	G4	G6
14	TB4	G5	G7(MSB)
15	TB5	B0(LSB)	B2
19	TB6	B1	B3
20	TC0	B2	B4
22	TC1	B3	B5
23	TC2	B4	B6
24	TC3	B5	B7(MSB)
27	TC4	NC	NC
28	TC5	(RSV1)	(RSV1)
30	TC6	DE	DE
50	TD0	R6	R0(LSB)
2	TD1	R7(MSB)	R1
8	TD2	G6	G0(LSB)
10	TD3	G7(MSB)	G1
16	TD4	B6	B0(LSB)
18	TD5	B7(MSB)	B1
25	TD6	(NA)	(NA)

Interface block diagram

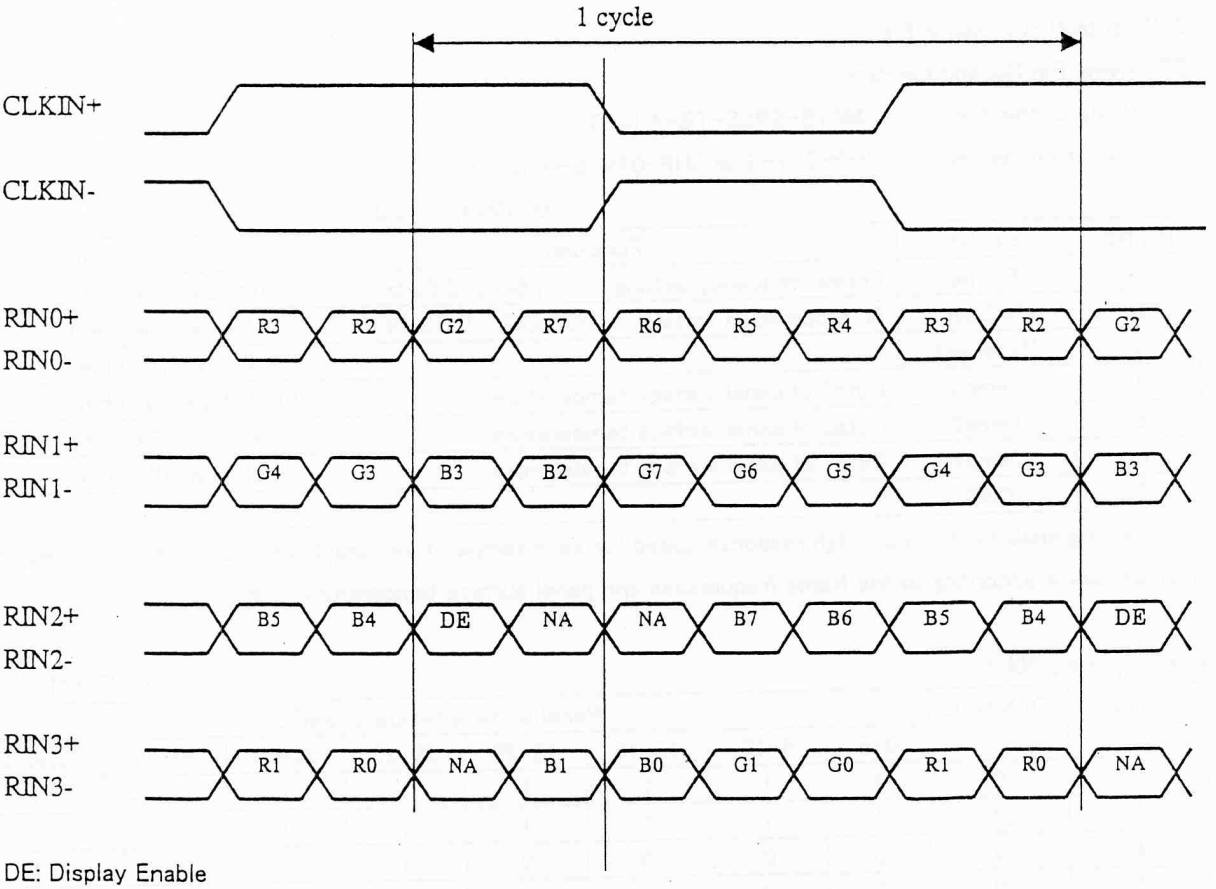
Corresponding Transmitter:THC63LVDM83A(THine) etc.



SELLVDS= Low(GND)



SELLVDS= High(3.3V) or Open

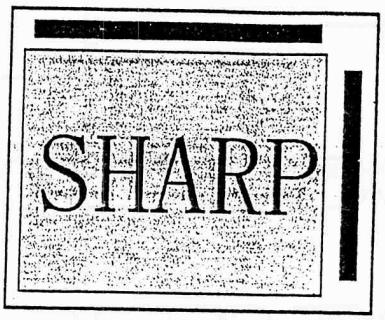


DE: Display Enable

NA: Not Available (Fixed Low)

【Note 2】 Do NOT apply DE (enable signal) under fixed "High" setting during the operation, although horizontal display position is prescribed by the DE (enable signal) signal Rise.

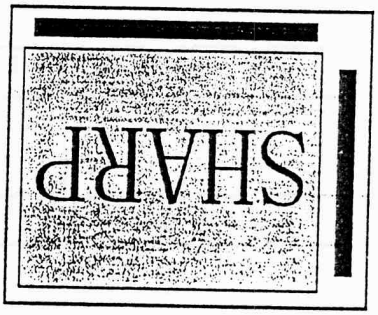
【Note 3】 Reversal terminal for horizontal and vertical directions



R/L : L
U/D : L

R/L : H
U/D : L

R/L : L
U/D : H



R/L : H
U/D : H

CN2(O/S control) -(Shown in Fig 1)

OS Driving Pin No. and function

Using connector : SM07B-SRSS-TB-A (JST)

Mating connector : SHR-07V-S or SHR-07V-S-B (JST)

0: (GND) ,1: (3.3V)

Pin No.	Symbol	Function	Default
1	Frame	Frame frequency setting 1:60Hz, 0:50Hz	Pull down(10k ohm)
2	O/Sset	O/S operation setting 1:OS_ON, 0:OS_OFF	Pull down(10k ohm)
3	Reserved		Pull down(10k ohm)
4	Temp3	Data3 of panel surface temperature	Pull down(10k ohm)
5	Temp2	Data2 of panel surface temperature	Pull down(10k ohm)
6	Temp1	Data1 of panel surface temperature	Pull down(10k ohm)
7	GND		

This table setting enables to realize high response speed for each temperature conditions. Each terminal need to be set as shown below according to the frame frequencies and panel surface temperature ranges.

1. Frame frequency 60Hz

0(GND) or1: (3.3V)

Pin no.	O/S OFF	Panel surface temperature(°C)							
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	over35
1	0	1	1	1	1	1	1	1	1
2	0	1	1	1	1	1	1	1	1
4	0	0	0	0	0	1	1	1	1
5	0	0	0	1	1	0	0	1	1
6	0	0	1	0	1	0	1	0	1

2. Frame frequency 50Hz　　0(GND) or1: (3.3V)

Pin no.	O/S OFF	Panel surface temperature(℃)							
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	over35
1	0	0	0	0	0	0	0	0	0
2	0	1	1	1	1	1	1	1	1
4	0	0	0	0	0	1	1	1	1
5	0	0	0	1	1	0	0	1	1
6	0	0	1	0	1	0	1	0	1

【Note】

Correlate the surface temperature of panel with the thermo-sensors readings. Then input the temperature data (3 bit)converted from temperature readings at the thermo-sensors into panel surface temperature.

Place the thermo-sensors so that the readings synchronize with the panel surface temperature.

At overlapping temperature area, please determine the signals by visually checking the image quality.

4-2. Inverter driving for back light

CN3　Supplying for Inverter Power　Using connector : S12B-PH-SM3-TB(JST)

Matching connector : PHR-12(JST)

Terminal #	Signal	Functions			
1	V_{ON}	Back light ON／OFF	3.6V(=High)	Inverter in action	
			0V(=Low)	Inverter at still	
			OPEN	Inverter at still	
2	PWM_{SEL}	Setting of PWM light adjustment 【Note 1】	3.6V(=High)	V_{BRT2} select	
			0V(=Low)	V_{BRT1} select	
			OPEN	Inverter at still	
3	V_{BRT1}	PWM light adjustment pulse input 【Note 1】	PWM DUTY is controlled	DUTY:100%	Bright(MAX)
				DUTY:10%	Dark(10%)
				OPEN	Inverter at still
4	V_{BRT2}	PWM light adjustment analogue input 【Note 1】	Input voltage	5V	Dark(15%)
				0V	Bright(MAX)
				OPEN	Prohibition setup
5	V_{BRT3}	Current light adjustment analogue input 【Note 2】	Input voltage	5V	Bright(MAX)
				0V	Dark(75%)
				OPEN	Bright(MAX)
6	GND	GND			
7	V_{INV}	+12V			
8	V_{INV}				
9	V_{INV}				
10	GND	GND			
11	GND				
12	GND				

* GND(Ground) of Inverter doesn't contact GND(Ground) of LCD module.

【Note 1】

Any terminal settings (e.g. voltage, short wave input/ Low, High or fixed) will be ignored under following two particular settings, as the adjustments are off from regular functions.

4pin(V_{BRT2}) setting when 2pin(PWM_{SEL})="Low"

3pin(V_{BRT1}) setting when 2pin(PWM_{SEL})="High"

【Note 2】

Either one of the two following settings is recommended when utilizing current light adjustment function through 5 pin(V_{BRT3}).

① 2pin(PMW_{SEL})="Low"、3pin(V_{BRT1})=DUTY100%

or

② 2pin(PMW_{SEL})="High"、4pin(V_{BRT2})=0V

Through this particular setting, luminance ratio can be adjustable from 75% up to 100% by altering 5 pin voltage within 0V and 5V. When adjusting the luminance under 75% ratio, please apply PMW light adjustment method.

4-3. Back light driving

The back light system is under-lighting type with 6 CCFTs(Cold Cathode Fluorescent Tube).
The characteristics of the lamp are shown in the following table. The value mentioned below is at the case of one CCFT.

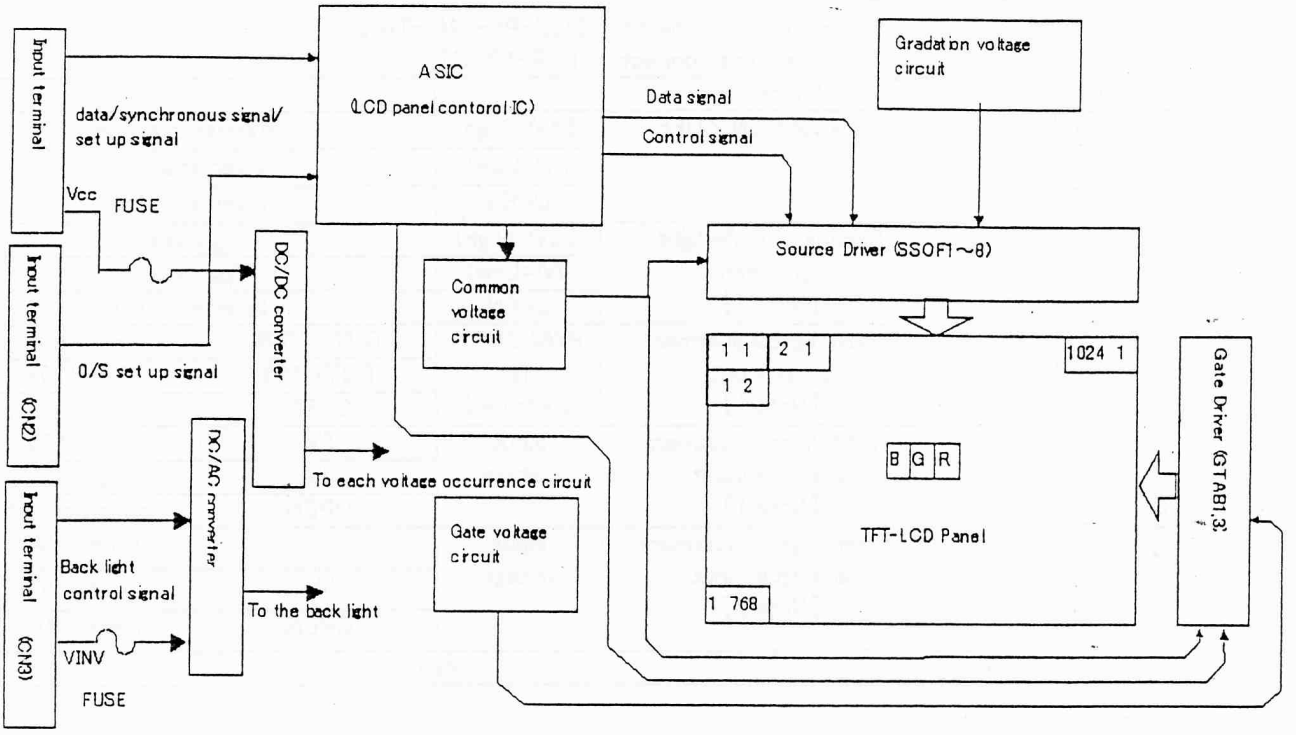
Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Life time	T_L	50000	-	-	Hour	【Note 1,2】

【Note 1】Lamp life time is defined as below in the continuous operation under the condition of Ta=25℃ and Brightness Control (100%)

- Brightness becomes 50% of the original value under standard condition.

【Note 2】 Definition is based upon when the longer edge of the LCD module is placed horizontally (in landscape position).
The length of LCD module's life time may vary if the module is placed vertically (in a portrait position), due to the lopsided mercury in the CCFT lamps.

4-4 LCD Module Block Diagram



5. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage (for Control)	V_{IC}	Ta=25 ℃	-0.3～+3.6	V	【Note 1】
5V supply voltage (for Control)	Vcc	Ta=25 ℃	0～+ 6	V	
Input voltage (for Inverter)	V_{II}	Ta=25 ℃	0～+ 6	V	【Note 2】
12V supply voltage (for Inverter)	V_{INV}	Ta=25 ℃	0～+14	V	
Storage temperature	T_{stg}	-	-25～+60	Degree	【Note 3】
Operation temperature (Ambient)	T_{opa}	-	0～+50	Degree	

【Note 1】 SELLVDS, R/L, U/D ,Frame, O/S set, Temp1, Temp2, Temp3
【Note 2】 V_{ON} , PWM_{SEL} , $V_{BRT1,2,3}$
【Note 3】 Humidity 95%RH Max.(Ta≦40 degree)
Maximum wet-bulb temperature at 39 ℃ or less.(Ta>40℃)
No condensation.

6. Electrical Characteristics

6-1. Control circuit driving

Ta=25 degree

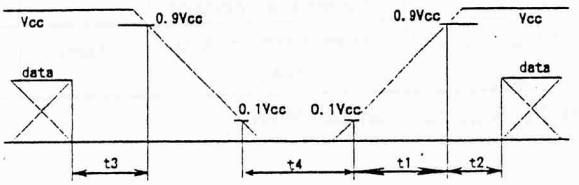
Parameter		Symbol	Min.	Typ.	Max.	Uniit	Remark
+5V supply voltage	Supply voltage	Vcc	+4.5	+5.0	+5.5	V	【Note 1】
	Current dissipation	Icc	−	1100	2000	mA	【Note 2】
Permissive input ripple voltage		V_{RP}	−	−	100	mVP-P	Vcc=+5.0V
Differential input threshold voltage(High)		VTH	−	−	+100	mV	Vcm=+1.2V 【Note 3】
Differential input threshold voltage(Low)		VTL	−100	−	−	mV	Vcm=+1.2V 【Note 3】
Input leak current (High)		I_{OH}	−	−	±10	μA	V_I =0V 【Note 4】
Input leak current (Low)		I_{OL}	−	−	±10	μA	V_I =Vcc 【Note5】
Input Low voltage		V_{IL}	-0.3	0.0	0.9	V	【Note 6】
Input High voltage		V_{IH}	3.0	3.3	3.6	V	
Input leak current (Low)		I_{OL1}	−	−	1.0	μA	V_I =0V 【Note 6】
Input leak current (High)		I_{OH1}	−	−	1.0	μA	V_I =Vcc 【Note 6】

Note 1】

1) Input voltage sequences

0 < t1 ≦ 10ms, 0 < t2 ≦ 10ms

0 < t3 ≦ 1s, t4 ≧ 1s



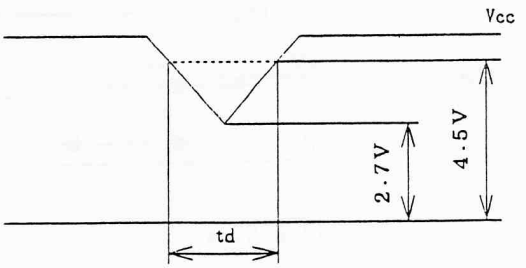
2) Dip conditions for supply voltage

a) 2.7V ≦ Vcc < 4.5V

td ≦ 10ms

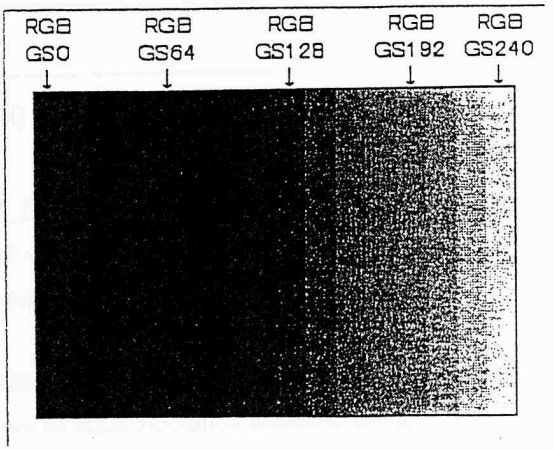
b) Vcc < 2.7V

Condition of Dip conditions for supply voltage is based on input voltage sequence.



【Note 2】Typical current situation : 16 gray-bar pattern(Vcc=+5.0V)

The explanation of RGB gray scale see section 8.



【Note 3】 VI_{CM}

【Note 4】 V_T= 2.4V, LVDS signal

【Note 5】 V_T= 0V, LVDS signal

【Note 6】 SELLVDS, L/R, U/D

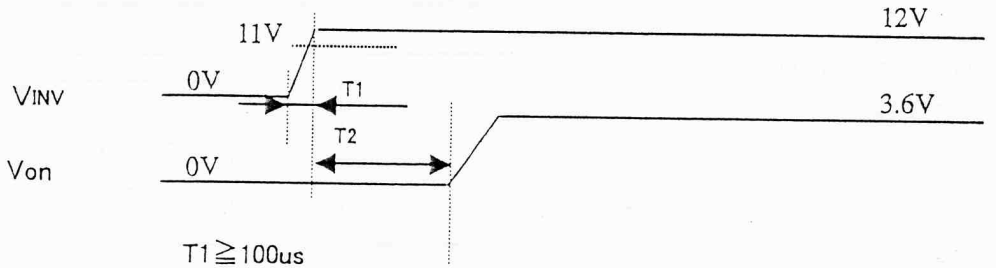
6-2. Inver driving for back light

The back light system is under-lighting type with 6 CCFTs (Cold Cathode Fluorescent Tube)

Ta=25℃

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
+12V	Supply Voltage	V_{INV}	11.0	12.0	13.0	V	【Note 1】
	Current dissipation	I_{INV}	-	4.0	4.5	A	Vinv=+12V Brightness =MAX 【Note 4】
Lamp Current		I_L	-	6.0	6.5	mArms	Vinv=+12V Brightness =MAX
Permissive input ripple voltage		V_{INVRP}	-	-	200	mV_{P-P}	V_{INV}=+12V
Von	Input voltage (OFF)	V_{ONL1}	0		0.5	V	【Note 1,2】
	Input voltage (ON)	V_{ONH1}	3.0	3.6	5.0	V	
Brightness control (V_{BRT1})	Burst Low voltage	V_{BRT1L}	0	-	0.5	V	【Note 2】
	Burst High voltage	V_{BRT1H}	3.0	-	5.0	V	
	Burst Duty%	$BRT1_{DUTY}$	5	-	100	%	
	Input Burst Frequency	1/Bi	100	-	350	Hz	
Brightness control (V_{BRT2})	Brightness control MAX	V_{BRT2}	0	-	0.3	V	【Note 2,3】
	Changeable Voltage		0.7	-	5.0	V	
Brightness control (V_{BRT3})	Brightness control MAX	V_{BRT3}	0	-	5.0	V	【Note 2】

【Note 1】1)V_{INV}-turn-on condition

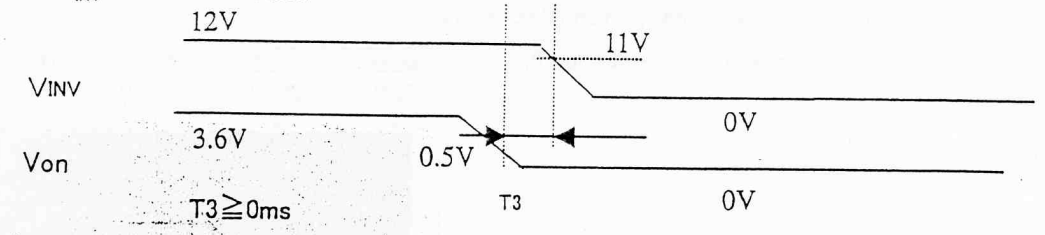


T1≧100us

T2≧0ms

※Set V_{INV} start (rise) up speed 100 micro second and above to prevent inrush current.

2) V_{INV}-turn-off condition



T3≧0ms

【Note 2】impedance V_{ON}:50KΩ, PWM_{SEL}:6KΩ, V_{BRT1}:20KΩ, V_{BRT2}:20KΩ, V_{BRT3}:20KΩ

【Note 3】Refrain from using the device under the condition V_{BRT3}=0.3 ~0.7 〔V〕 because of the possibility of flicker on display. In case of V_{BRT} > 5.0V, the protective circuit may stop driving the inverter.

【Note 4】Measured under a stable condition (30 mins after lighting on). The reading may become higher than 4.9A max under unstable condition, such as immediately after lighting.

7. Timing characteristics of input signals

7-1. Timing characteristics

Timing diagrams of input signal are shown in Fig.2

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	1/Tc	60	65	75	MHz	
Data enable signal	Horizontal period	TH	1152	1344	1720	clock	
			20.0	20.7	25.8	μs	
	Horizontal period (High)	THd	1024	1024	1024	clock	
	Vertical period	TV	773	806	1008	line	【Note1,3】
			16	16.7	21	mS	
	Vertical period (High)	TVd	768	768	768	line	

【Note1】 When vertical period is very long, flicker and etc. may occur.

【Note2】 It is recommend suppling voltage, after displaying Black pattern.

【Note3】 It is recommend making sure that length of vertical period is an integral multiple of horizontal length of period. Otherwise, the screen may not display properly.

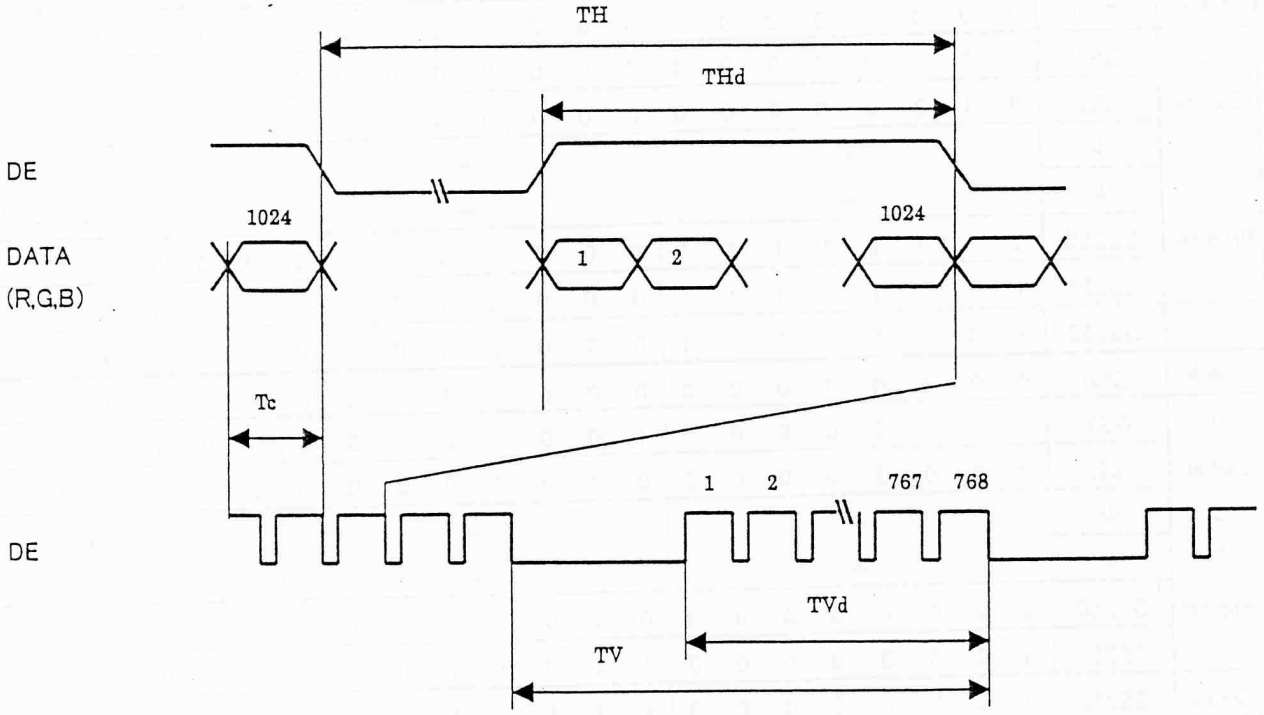
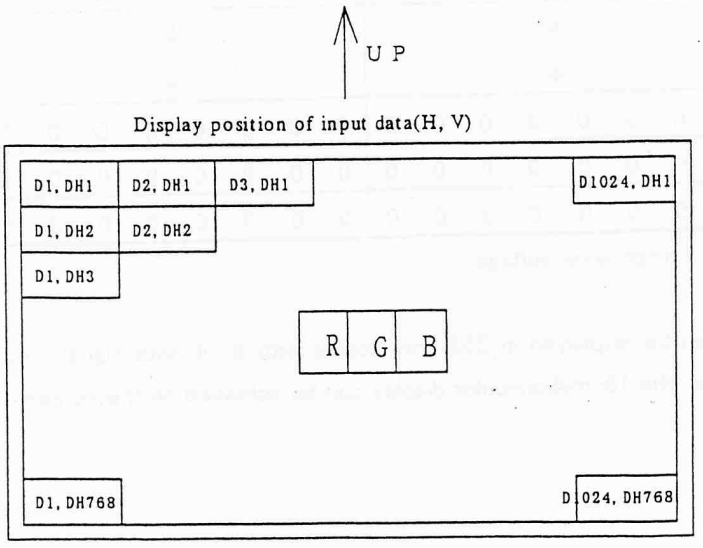


fig. 2

7-2. Input data signal and display position on the screen



8. Input Signal, Basic Display Colors and Gray Scale of Each Color

	Color & Gray scale	Gray Scale	Data signal																									
			R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
Basic Color	Black	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X	X	1	1	1	1	1	1
	Green	—	0	0	0	0	0	0	0	0	X	X	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	—	0	0	0	0	0	0	0	0	X	X	1	1	1	1	1	1	X	X	1	1	1	1	1	1
	Red	—	X	X	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	—	X	X	1	1	1	1	1	1	0	0	0	0	0	0	0	0	X	X	1	1	1	1	1	1
	Yellow	—	X	X	1	1	1	1	1	1	X	X	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	—	X	X	1	1	1	1	1	1	X	X	1	1	1	1	1	1	X	X	1	1	1	1	1	1
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓								↓								↓				
	⇩	↓				↓								↓								↓				
	Brighter	GS250	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS251	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS252	X	X	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓								↓								↓				
	⇩	↓				↓								↓								↓				
	Brighter	GS250	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
	⇩	GS251	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green	GS252	0	0	0	0	0	0	0	0	X	X	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	⇧	↓				↓								↓								↓				
	⇩	↓				↓								↓								↓				
	Brighter	GS250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1
	⇩	GS251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1
	Blue	GS252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X	X	1	1	1	1	1	1

0 :Low level voltage, 1 :High level voltage,

Each basic color can be displayed in 253 gray scales with 8 bit data signals. According to the combination of total 24 bit data signals, the 16−million−color display can be achieved on the screen. (X: don't care)

9. Optical characteristics

Ta=25°C, Vcc=+5.0V , V_{INV}=＋12.0V, Brightness=MAX

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ21, θ22	CR≧10	80	85	－	Deg.	【Note1,4】
	Vertical	θ11 θ12		80	85	－	Deg.	
Contrast ratio		CRn	Best Viewing Angle	600	800	－		【Note2,4】
Response time (White and Black / Black and White)		τr	θ=0 deg.	－	16	25	ms	【Note3,4】
		τd		—	5	10		
Response time (Any level of gray and gray)		τr		－	16	45	ms	【Note5】
		τd		—	15	45		
Chromaticity of white		X		0.257	0.287	0.317	－	【Note 4】
		Y		0.266	0.296	0.326	－	
Chromaticity of Red		X		0.615	0.645	0.675	－	
		Y		0.306	0.336	0.366	－	
Chromaticity of Green		X		0.245	0.275	0.305	－	
		Y		0.581	0.611	0.644	－	
Chromaticity of Blue		X		0.114	0.144	0.174	－	
		Y		0.046	0.076	0.106	－	
Luminance of white		YL1		400	500	－	cd/m²	【Note 4】
Luminance uniformity		δW		－	－	1.25		【Note 6】

*The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.3 below.

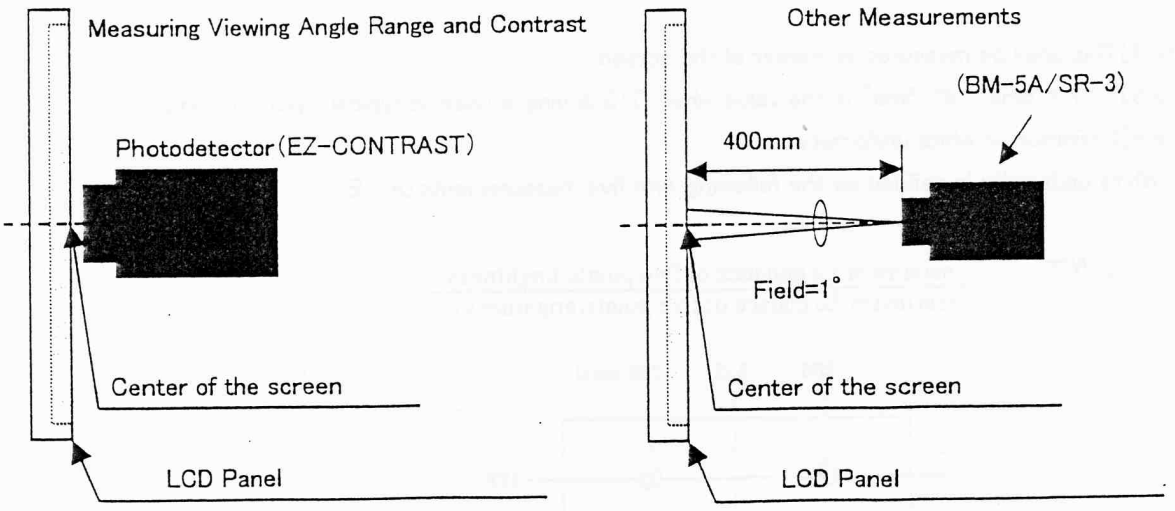
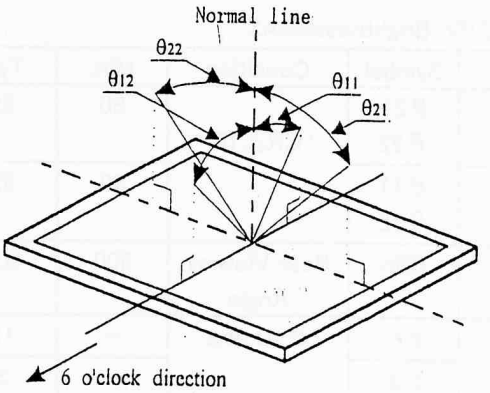


Fig.3 Optical characteristics measurement method

【Note 1】Definitions of viewing angle range :



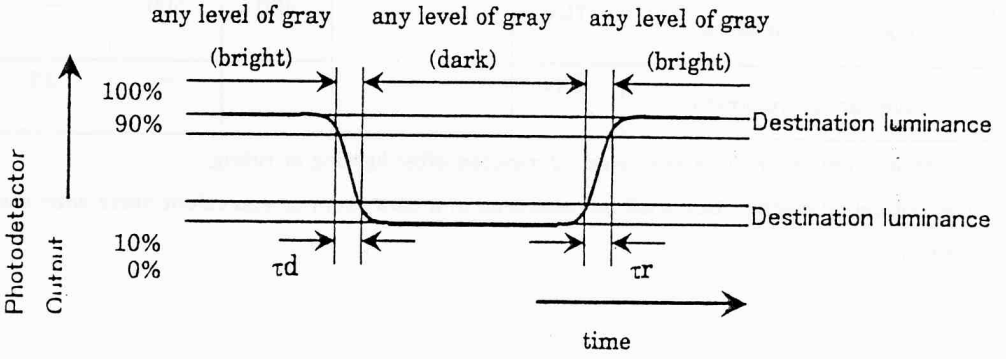
【Note 2】Definition of contrast ratio :

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminace(brightness) with all pixels white}}{\text{Luminace(brightness) with all pixels black}}$$

【Note 3】Definition of response time

The response time is defined as the following figure and shall be measured by switching the input signal for "any level of gray (bright)" and "any level of gray (dark)".



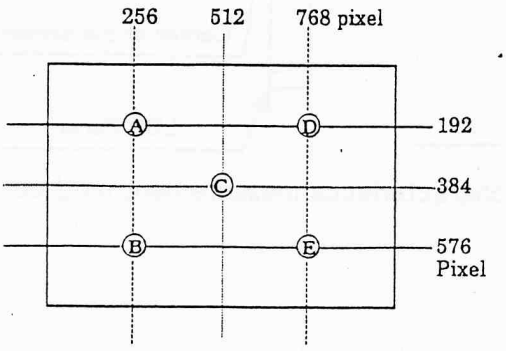
【Note 4】This shall be measured at center of the screen.

【Note 5】" τ r =16ms, τ d=15ms" is the value when O/S driving is used at typical input time value .

【Note 6】Definition of white uniformity ;

White uniformity is defined as the following with five measurements.(A～E)

$$\delta W = \frac{\text{maximum Luminance of five points(brightness)}}{\text{minimum Luminace of five points(brightness)}}$$



10. Display Quantity

The display quality of the color TFT-LCD module shall be in compliance with the incoming inspection Standard.

11.Warning

The module includes the inverter circuit, which generates high voltage. Do not touch the inverter cover DS and CCFT lamp terminals when inverter is turning on. Please alert "Don't touch it",if someone may touch.

12 Handling Precautions of the module

a) Be sure to turn off the power supply when inserting disconnecting the cable.

b) This product is using the parts(inverter, CCFT etc) which generate the high voltage. Therefore, during operating, please don't touch these parts.

c) Brightness control voltage is switched for "ON" and "OFF", as shown in Fig.5. Voltage difference generated by this switching, ΔVINV, may affect a sound output, etc. when the power supply is shared between the inverter and its surrounding circuit. So, separate the power supply of the inverter circuit with the one of its surrounding circuit.

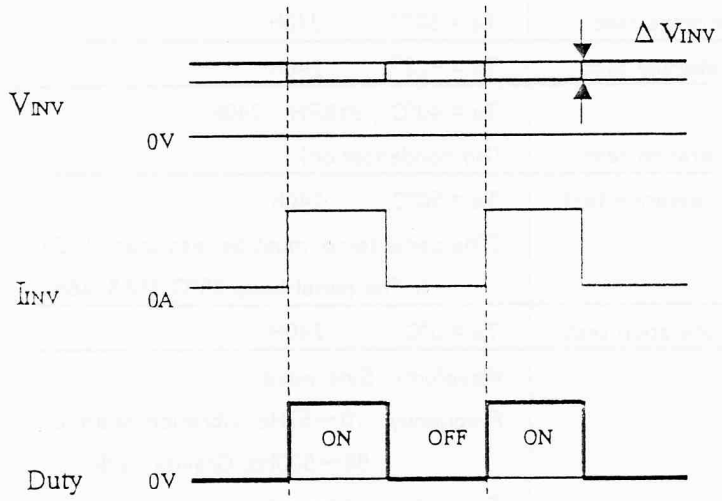


Fig.5 Brightness control voltage.

d) Be sure to fix the module in the same plane so that the module can be installed without any extra stress such as warp or twist.

e) Since the front polarizer is easily damaged, pay attention to treat it.

f) Since long contact with water may cause discoloration or spots, wipe off water drop immediately.

g) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

h) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

i) Since CMOS LSI is used in this module, take care of static electricity and consider wearing the earth personnel when handling.

j) Ground attachment to the LCD module should be considered, so that influences from EMI and outer noise is minimized.

k) The module has some printed circuit boards (PCBs) on the back side, take care to keep them form any Stress or pressure when handling or installing the module; otherwise some of electronic parts on the PCBs may be damaged.

l) Observe all other precautionary requirements in handling components.

m) When some pressure is added onto the module from rear side constantly, it causes display non-uniformity issue, functional defect, etc.. So, please avoid such design

n) When handling LCD modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD modules.

o) Blow off dust with N2 blower for which static electricity preventive measure has been taken. Ionized air gun is recommended.

p) Please connect from the product side to the inverter's power source ground line, as the PWB's ground for inverter is not connected to module's bezel.

13. Packing form

a) Piling number of cartons: 3(maximum)

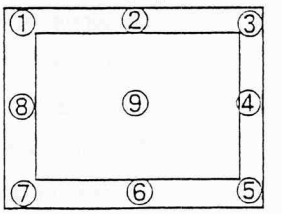
b) Packing quantity in one carton : 5

c) Carton size : 537mm(W) × 528mm(H) × 400mm(D)

d) Total mass of one carton filled with full modules : 16.0Kg (MAX)

e) Packing form figures are shown in Fig.4

14. Reliability test items

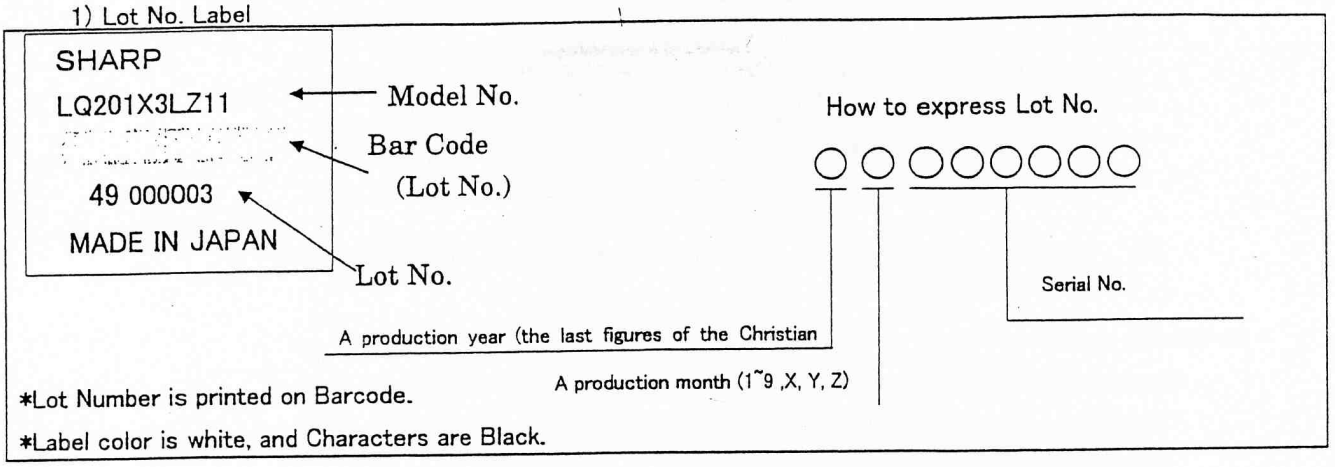
No	Test item	Conditions
1	High temperature storage test	Ta = 60°C 240h
2	Low temperature storage test	Ta = -25°C 240h
3	High temperature & high humidity operation test	Ta = 40°C ; 95%RH 240h (No condensation)
4	High temperature operation test	Ta = 50°C 240h (The panel temp. must be less than 60°C) * If The panel temp 65°C MAX, 48h
5	Low temperature operation test	Ta = 0°C 240H
6	Vibration test (non- operating)	Waveform : Sine wave Frequency : 10～57Hz/Vibration width (one side) : 0.075mm : 58～500Hz/Gravity : 9.8m/s^2 Sweep time : 11minutes Test period : 3 hours (1 hour for each direction of X,Y,Z)
7	Shock test (non- operating)	Max. gravity : 490m/s^2 Pulse width : 11ms, sine wave Direction : ±X, ±Y, ±Z, once for each direction.
8	Thermal shock test (non- operating)	Ta=-25°C～60°C ; 5 cycles Test period : 10 hours (1 hour for each temperature)
9	ESD test	Contact discharge method: C=150pF,R=330Ω (non- operating) Pass +/- 15kV (operating) Pass +/- 8kV Air discharge method: C=150pF,R=330Ω (non- operating) Pass +/- 20kV (operating) Pass +/- 10kV *Discharge points : 9 points Number of discharge : once per point *Discharge points  Module front side

【Result evaluation criteria】

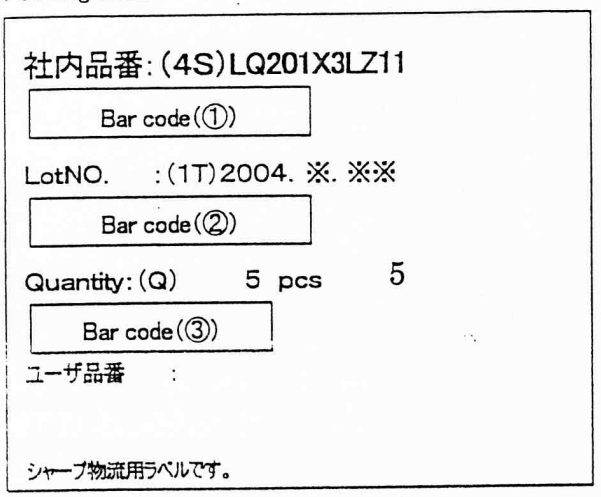
Under the display quality test conditions with normal operation state, these shall be no change which may affect practical display function.

15. Others

1) Lot No. Label



2) Packing Label



① Model No. (LQ201X3LZ11)

② Lot No. (Date)

③ Quantity

3) Adjusting volume have been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

4) Disassembling the module can cause permanent damage and should be strictly avoided.

5) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

6) Turn off the inverter circuit for back light before turning off the power source for the controller.

7) Rust is out of considerations.

8) Regulation on usage of destructible chemical substances for the Ozone layer

Regulated substances: CFCS、Quadru Carbon Chloride、1,1,1-Tri chloro-ethylene (MethylChloroform)

a) above mentioned substances are not used in the product, and/or assembled unit and parts of this product

b) above mentioned substances are not used in the process of manufacturing the product and/or assembled unit and parts of this product.

9) Label of using material information

It is displaying the material of the optical parts with the label in the module back.

MATERIAL INFORMATION
OPTICAL FILM : > PC, PEST, AKUR-X, PC <
DIFFUSER SHEET : > PMMA-X, PET <
DIFFUSER BOARD : > MMA/S <
REFLECTOR : > PAK-QD, PET+PMP <
LENS FILM : > PET, AK-X<

10) Cold cathode fluorescent lamp in LCD PANEL contains a small amount of mercury.
Please follow local ordinances or regulations for disposal.

> COLD CATHODE FLUORESCENT LAMP IN LCD PANEL
> CONTAINS A SMALL AMOUNT OF MERCURY,PLEASE FOLLOW
> LOCAL ORDINANCES OR REGULATION FOR DISPOSAL
> 当該液晶ディスプレイパネルは蛍光管が組み込まれていますので、地方自治体の条例、または、規則に従って廃棄ください。

11) When any question or issue occurs, it shall be solved by mutual discussion.

16. Storage conditions

〈Environmental condition range of storage temperature and humidity〉

Temperature 0 to 40 degrees Celsius

Relative humidity 95% and below

【Note】 Please refer below as a mean value of the environmental conditions.

Summer time temperature 20 to 35 degrees Celsius
humidity 85% and below

Winter time temperature 5 to 15 degrees Celsius
humidity 85% and below

Please maintain within 240 hours of accumulated length of storage time, with conditions of 40 degrees Celsius and room humidity of 95%.

Direct sun light Please keep the product in a dark room or cover the product to protect from direct sun light.

Atmospheric condition Please refrain from keeping the product with possible corrosive gas or volatile flux.

Prevention of dew
* Please store the product carton either on a wooden pallet or a stand / rack to prevent dew. Do not place directly on the floor. In addition, to obtain moderate ventilation in between the pallet's top and bottom surfaces, pile the cartons up in a single direction and in order.
* Please place the product cartons away from the storage wall.
* Please maintain the storage area with an appropriate ventilation. It is recommendable to furnish the storage area with equipments such as ventilation systems.
* Please maintain the ambient temperature within the range of natural environmental fluctuation.

Storage period Within above mentioned conditions, maximum storage period should be one year.

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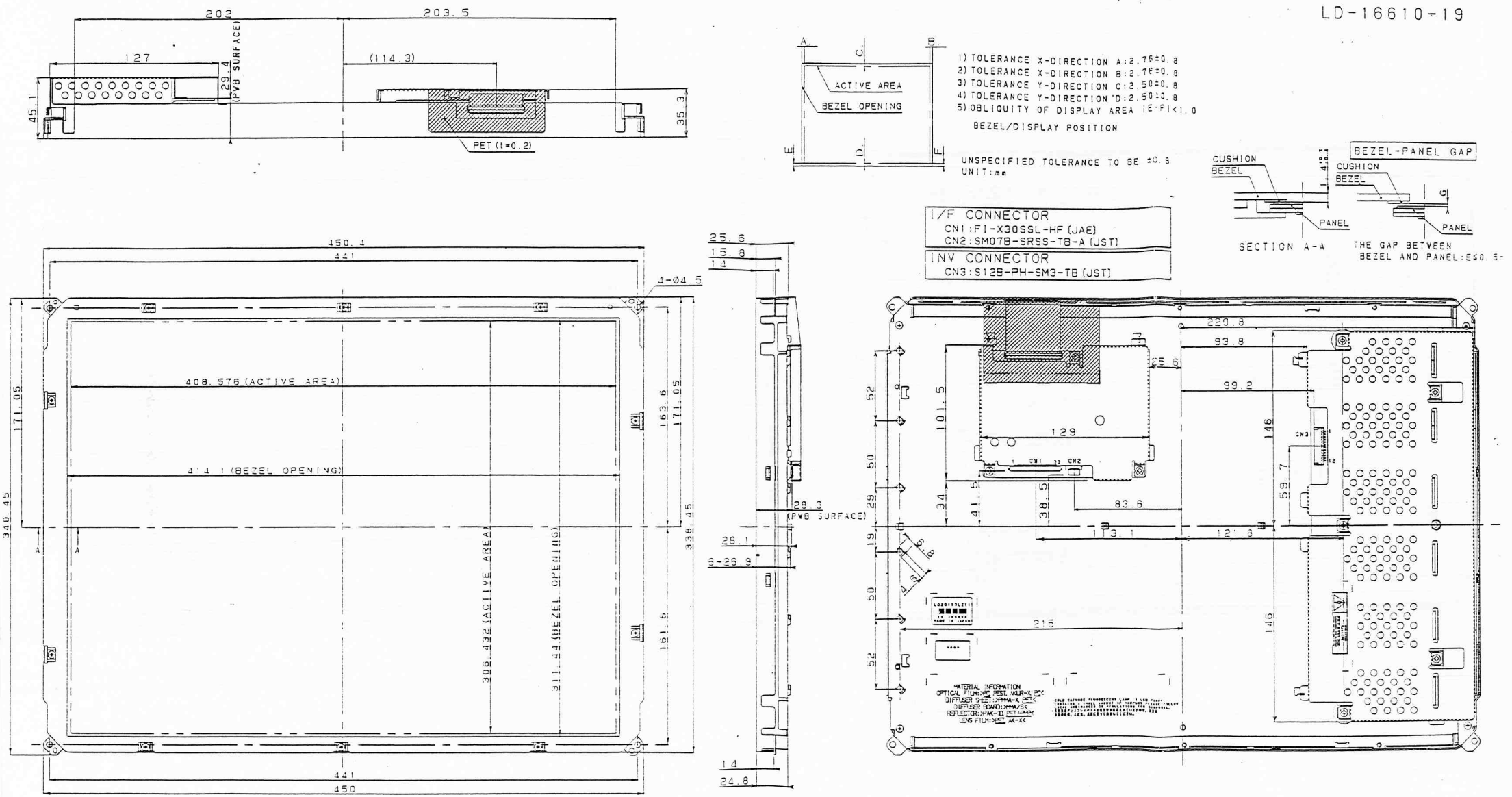

Fig. 1 LQ201X3LZ11 OUTLINE DIMENSIONS

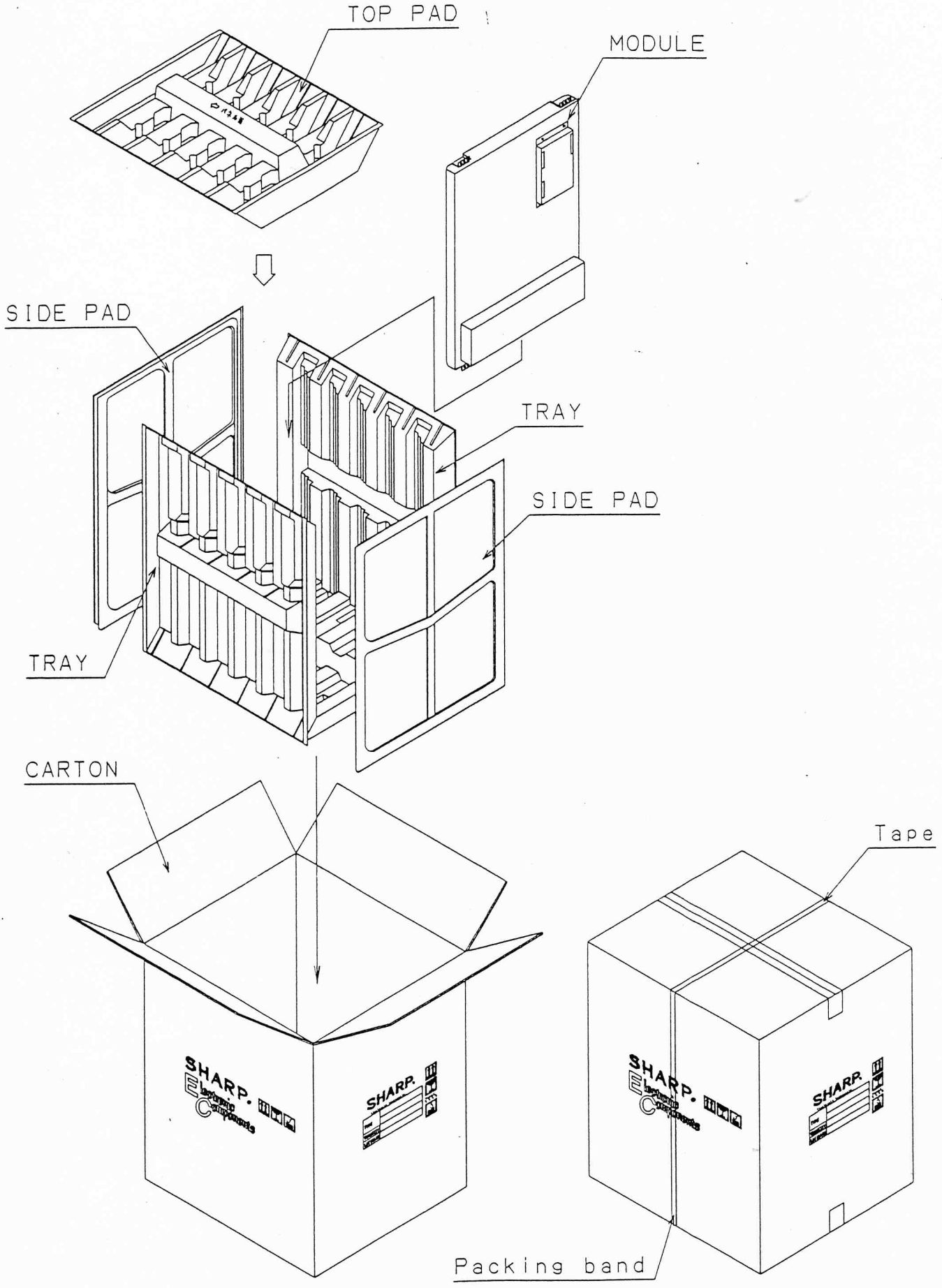

Fig. 4 PACKING FORM